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May 27, 2021

**H&S Bosma Dairy Lagoon Nos. 1, 2, and 3**

Administrative Order on Consent Docket No. SDWA-10-2013-0080



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# H&S Bosma Dairy Lagoon Nos. 1, 2, and 3 Abandonment Plan

Prepared for H&S Bosma Dairy

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# H&S Bosma Dairy Lagoon Nos. 1, 2, and 3 Abandonment Plan

**Prepared for**

H&S Bosma Dairy  
5860 East Zillah Drive Road  
Granger, Washington 98953

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## ABBREVIATIONS

CAFO	Concentrated Animal Feeding Operation
Consent Order	Administrative Order on Consent SDWA-10-2013-0080
Dairy	H&S Bosma Dairy
EPA	U.S. Environmental Protection Agency
H:V	horizontal to vertical (ratio)
mg/kg	milligrams per kilogram
Plan	Lagoon Abandonment Plan
SVID	Sunnyside Valley Irrigation District
WA NRCS	Washington State Natural Resources Conservation Service

# 1 Introduction

This Lagoon Abandonment Plan (Plan) was prepared by Anchor QEA, LLC, on behalf of H&S Bosma Dairy (the Dairy) as required by the U.S. Environmental Protection Agency (EPA) Region 10 Administrative Order on Consent SDWA-10-2013-0080 (Consent Order). The abandonment projects described in this plan will be completed in two phases, one commencing in 2021 and the second commencing in 2022.

The Dairy is completing four lagoon lining or abandonment projects in 2021, including the abandonment of Lagoon No. 3, and two abandonment projects in 2022, including Lagoon Nos. 1 and 2. The lagoon projects will be consistent with the schedule agreed to in the 2016 *Final Modified Lagoon Work Plan* (Anchor QEA 2016). This Plan describes the plan for abandonment of Lagoon Nos. 1, 2, and 3. These lagoons have previously been used to collect and store stormwater and manure waste generated from the Dairy's operations but will no longer be required due to implemented storage and waste management improvements.

At the completion of lagoon abandonments, the lagoons will be regraded to support crop production consistent with current agricultural practices.

This Plan implements the requirements of the 2016 *Final Modified Lagoon Work Plan* (Anchor QEA 2016) as approved by EPA. It also exceeds the requirements of Washington State Natural Resources Conservation Service (WA NRCS) *Conservation Practice Standard 360 – Waste Facility Closure* (WA NRCS 2013a) and demonstrates compliance with nutrient management requirements of WA NRCS *Conservation Practice Standard No. 590 – Nutrient Management* (WA NRCS 2013b).

## 1.1 Report Organization

The remaining sections of this Plan are organized as follows:

- **Section 2 – Existing Conditions.** This section reviews the current conditions of the Dairy and presents the approximate dimensions of Lagoon Nos. 1, 2, and 3.
- **Section 3 – Abandonment Procedures.** This section discusses the removal of liquids and organic solids, soil confirmation testing procedures, soils and nutrient management, final abandonment procedures, and submission of the final completion report.
- **Section 4 – Schedule.** This section outlines the abandonment timeline.
- **Section 5 – References.** This section provides references for the materials cited in this Plan.

## 2 Existing Conditions

The Dairy is located at 5860 East Zillah Drive Road in Granger, Washington. Figure 1 shows the location of Lagoon Nos. 1, 2, and 3. Estimated dimensions and capacities of the existing lagoons are provided in Table 1. The lagoons were originally created within a natural depression in the topography, bounded by Kirks Road and the Sunnyside Canal (owned by the Sunnyside Valley Irrigation District [SVID]), with the addition of earthen berms at the southern ends of what would become Lagoon Nos. 2 and 3. The lagoons are constrained by a drainage path to the west, cropland to the east, Kirks Road to the north, and the Sunnyside Canal and access road to the south.

Lagoon Nos. 1, 2, and 3 have historically been used to store stormwater runoff and manure waste generated from Dairy operations. Liquid collected within the lagoons is stored and then pumped to application fields or to the existing lagoon system.

**Table 1**  
**Lagoon Nos. 1, 2, and 3 Approximate Dimensions and Capacity**

Lagoon	Length (feet)	Width (feet)	Depth (feet)	Capacity (million gallons)	Capacity (acre-feet)	Approximate Interior Side Slope
1	950	210	10	10.7	32.8	2H:1V
2	450	100	10	1.8	5.5	3H:1V
3	580	120	10	2.3	7.2	3H:1V

### 3 Abandonment Procedures

This section describes the lagoon abandonment procedures, including the following:

- Liquids, organic solids, and vegetation removal
- Soil confirmation testing
- Soil and nutrient management
- Final lagoon abandonment
- Completion report submittal

Most of the lagoon abandonment activities will be performed by Dairy personnel and equipment. Soil confirmation testing and completion report submittal will be performed by Anchor QEA. The abandonment efforts will be completed in two phases, one commencing in 2021 and the other in 2022.

#### 3.1 Liquids and Organic Solids Removal

Prior to sampling, the lagoon will have liquids, organic solids, and vegetation (if present) removed. Liquids contained within the lagoon will be transferred to an in-service, lined lagoon. After liquid removal, organic solids will be removed and placed in the composting area. Solids will be removed down to the current lagoon soil foundation material.

#### 3.2 Soil Confirmation Testing

Following removal of liquids, organic solids, and vegetation, soil testing will be conducted within the lagoon to confirm removal of manure and depth of remediation required.

Confirmation testing will be conducted at five locations within Lagoon Nos. 2 and 3 and eight locations within Lagoon No. 1, including samples from the lower portion of each sidewall and the lagoon bottom. See Figure 2 for the general sampling scheme.

Soil sampling from the lagoon interior will be performed using the following methods:

1. A geoprobe will be used to advance a core tube with a plastic lining approximately 10 feet deep at each testing location. The core tube will preserve the soil column and allow test samples to be collected from discrete intervals.
2. Initial soil samples will be collected from a depth interval of 0 to 12 inches below ground surface.
3. Subsequent samples will be collected at each 1-foot interval to a depth of 10 feet.
4. Sampling personnel will record the location and depth of each soil sample.
5. After samples have been collected, the samples will be placed in appropriate containers, and a custody seal bearing the sampler's name or initials and date will also be placed on the container.

Laboratory analysis of the soil samples will be performed by SoilTest Farm Consultants, Inc., a State of Washington-certified analytical laboratory and a North American Proficiency Testing-accredited laboratory located at 2925 Driggs Drive, Moses Lake, Washington. Sample management, packing, shipment, analytical testing, quality assurance/quality control, and data validation protocols will be consistent with those defined in the *Dairy Facility Application Field Management Plan* (Anchor QEA 2018) as follows:

- Ammonium (as nitrogen) by Western Coordinating Committee S-3.50
- Nitrate (as nitrogen) by Western Coordinating Committee S-3.10

Soil samples will be analyzed in phases, starting with the upper 1-foot interval. Archived samples will be analyzed from deeper depths until a clean soil horizon is reached. Consistent with the 2016 *Modified Lagoon Work Plan* (Anchor QEA 2016), the clean soil horizon is defined as soils with the sum of ammonia-nitrogen and nitrate-nitrogen equal to or less than 45 milligrams per kilogram (mg/kg).

Soil sampling data will be provided to EPA in a Transmittal Memorandum within 45 days of EPA approval of this Plan. That memorandum will also document the soil management approach to be implemented by the Dairy as described in Section 3.3.

### **3.3 Management of Lagoon Soils**

This section describes how nutrient-rich soils, if present, will be managed. This includes two different options as described in Sections 3.3.1 and 3.3.2. Both options involve extracting nutrients from the soils agronomically. The first does so by first excavating and relocating the soils. The other does so by extracting the nutrients from the soils in place using crops appropriate to the depth of the soil layer.

Prior to proceeding with soil management, EPA will be provided with a Transmittal Memorandum documenting the soil testing data collected as described in Section 3.2 and documenting the proposed soil management approach. If Option B is selected, the memorandum will specify the crop to be used and the expected treatment duration. The data collected as described in Section 3.2 will be used as the pre-treatment dataset, including sampling data at 1-foot intervals from the surface until an interval of soil is met that meets the target levels, defined as the sum of ammonia-nitrogen and nitrate-nitrogen equal to or less than 45 mg/kg.

#### **3.3.1 Option A – Excavation of Lagoon Soils**

The first option is the excavation of lagoon soils, as implemented during prior lagoon abandonments at the H&S Bosma Dairy. This option is well suited for small quantities of nutrient-rich soil. It is unnecessarily resource-intensive for larger quantities of soil.



Under this option, all soils exceeding the clean soil criteria will be excavated from Lagoon Nos. 1, 2, and 3 and moved to the manure composting area until the soils are placed on crop fields at an agronomic rate. The quantity of soil removed will be documented in the completion report.

### 3.3.2 *Option B – In-Place Treatment of Soils*

The second option for management of nutrient-rich lagoon soils is to treat them agronomically in place. This option is well suited for larger quantities of soil, reducing the quantity of fuel hydrocarbons required to accomplish the required work.

Depending on the depth of nutrient-rich soil, the soils will be treated by cropping the lagoon bottom and/or sides with appropriate plant species. The preferred species is alfalfa (*Medicago* spp.). Poplar trees (*Populus* spp.) may be used for treatment of deeper soils. The specific plant species will be selected based on the final depth of ammonia-nitrogen and nitrate-nitrogen as determined in Section 3.2. If the final depth of ammonia/nitrate is less than 6 feet, alfalfa will be selected; otherwise, poplar trees will be selected.

The treatment crop will be planted prior to December 31, 2021, for Lagoon No. 3 and prior to December 31, 2022, for Lagoon Nos. 1 and 2. The expected treatment time period will be estimated using nutrient budgets. These will be prepared by Agrimanagement, Inc. and included in the Notification Letter. Likely treatment periods are 1 to 2 years.

Irrigation will be provided as necessary to support optimal crop growth. The irrigation will be provided using solid sets. Irrigation will follow irrigation needs estimates provided by Agrimanagement. Prior to beginning irrigation, the Dairy will provide an irrigation plan to EPA that is designed to ensure that over-watering does not occur. Irrigation records will be maintained to document the dates and duration of irrigation, and these will be summarized in the monthly reports and in the completion report.

If alfalfa is used for treatment, the alfalfa will be harvested periodically consistent with standard Dairy practices. If poplar trees are used for treatment, harvest will be conducted only at the conclusion of soil treatment.

At the end of the treatment period, a second round of soil confirmation testing will be completed using the same locations, depths, and procedures as described in Section 3.2, except that all soil intervals that previously exceeded the 45 mg/kg nitrogen target concentrations will be tested for ammonia-nitrogen and nitrate-nitrogen (i.e., phased testing as described in Section 3.2 will not be performed). If testing confirms that the target nitrogen concentrations have been reached, then the crops will be removed (harvested) and the lagoon will proceed with final abandonment as described in Section 3.4.

If nitrogen levels remain in excess of the 45 mg/kg target concentrations, at least 1 crop year of additional treatment will be performed. At the end of this extended treatment period, soil testing will be repeated for any locations that remained in excess of the 45 mg/kg target nitrogen concentrations. Once testing confirms that the target nitrogen concentrations have been reached, then the crops will be removed and the lagoon will proceed with final abandonment as described in Section 3.4.

### **3.4 Final Abandonment Procedures**

After the removal or in-place treatment of nutrient-rich soils has been completed for all three lagoons, Lagoon Nos. 1, 2, and 3 will be regraded to remove the constructed berms separating Lagoon Nos. 2 and 3 consistent with Figure 2. Berm soils will be redistributed to restore the area to approximate original conditions prior to berm construction and to prepare the area for crop production. Because the area is intended for crop production, it is not necessary to create a flat grade. Regrading work to remove the berms cannot begin until all three lagoons have been abandoned. No work will be done within the SVID easement to the south of Lagoon No. 1.

### **3.5 Completion Report**

Following completion of lagoon abandonment, Anchor QEA will prepare and submit a completion report. That report will include the following information:

- A short narrative describing the lagoon abandonment work completed
- Copies of construction photographs showing the lagoon after emptying, during soil excavation/treatment, and after final abandonment
- Results of soil confirmation testing
- Statement that the closure followed WA NRCS *Conservation Practice Standard 360 – Waste Facility Closure* (WA NRCS 2013a) practices
- Documentation of site conditions after final abandonment, including regrading and associated stormwater improvements

## 4 Schedule

The abandonment activities described in this plan will be completed in two phases. Phase 1 will commence for Lagoon No. 3 in 2021. Phase 2 will commence for Lagoon Nos. 1 and 2 in 2022.

### 4.1 Phase 1

Initial soil testing for Lagoon No. 3 as described in Section 3.2 will be completed and reported to EPA in the Transmittal Memorandum within 45 days of EPA approval of this Abandonment Plan as follows:

- If treatment Option A is selected (excavation), then excavation and final abandonment activities will be completed by December 31, 2021. The completion report will be submitted to EPA within 60 days of completion and no later than March 1, 2022.
- If treatment Option B is selected (in-place agronomic treatment using alfalfa or poplar trees), the crop will be planted and irrigation equipment will be established by December 31, 2021. Confirmation testing will be performed at the end of the expected treatment period, likely 1 to 2 crop years from the start date. The crops will be harvested, and final abandonment will be completed within 120 days of final confirmation testing. The completion report will be submitted to EPA within 60 days of completion of final abandonment activities.

### 4.2 Phase 2

Initial soil testing for Lagoon Nos. 1 and 2 as described in Section 3.2 will be completed and reported to EPA in the Transmittal Memorandum by August 31, 2022, as follows:

- If treatment Option A is selected (excavation), then excavation and final abandonment activities will be completed by December 31, 2022. The completion report for Lagoon No. 3 will be submitted to EPA within 60 days of completion and no later than March 1, 2023.
- If treatment Option B is selected (in-place agronomic treatment using alfalfa or poplar trees), the crop will be planted, and irrigation equipment will be established by December 31, 2022. Confirmation testing will be performed at the end of the expected treatment period, likely 1 to 2 crop years from the start date. The crops will be harvested, and final abandonment will be completed within 120 days of final confirmation testing. The completion report for Lagoon Nos. 1 and 2 will be submitted to EPA within 60 days of completion of final abandonment activities.

## 5 References

Anchor QEA (Anchor QEA, LLC), 2016. *Final Modified Lagoon Work Plan*. Prepared for Liberty Dairy, LLC/H&S Bosma Dairy. December 2016.

Anchor QEA (Anchor QEA, LLC), 2018. *Dairy Facility Application Field Management Plan*. Prepared for Cow Palace, LLC, George DeRuyter & Son Dairy, LLC/D&A Dairy, LLC/George & Margaret, LLC, and Liberty Dairy, LLC/H&S Bosma Dairy. February 2018.

Ecology (Washington State Department of Ecology), 2017. Concentrated Animal Feeding Operation. National Pollutant Discharge Elimination System and State Waste Discharge General Permit. Issued: January 18, 2017.

WA NRCS (Washington State Natural Resources Conservation Service), 2013a. *Conservation Practice Standard No. 360 – Waste Facility Closure*. January 2013.

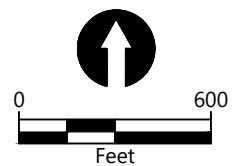
WA NRCS, 2013b. *Conservation Practice Standard No. 590 – Nutrient Management*. December 2013.

## Figures

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**SOURCE:** Aerial from Microsoft (Bing) 4/11/2018  
**HORIZONTAL DATUM:** Washington State Plane South,  
 NAD83, U.S. ft



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**Figure 1**  
**H&S Bosma Dairy Lagoon Map**  
 Lagoon Nos. 1, 2, and 3 Abandonment Report  
 H&S Bosma Dairy





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**Figure 2**  
**Proposed Sampling Locations and Grading**  
Lagoon Nos. 1, 2, and 3 Abandonment Plan  
H&S Bosma Dairy